

ABSTRACT

In a method of making a dual work function gate electrode of a CMOS semiconductor structure, the improvement comprising
5 formation of the dual work function gate electrode so that there is no boron penetration in the channel region and no boron depletion near the gate oxide, comprising:

a) forming a gate oxide layer over a channel of a nMOS site and over a channel of a pMOS site;

10 b) forming an undoped polysilicon layer over the gate oxide layer;

c) masking the pMOS site, forming an a-Si layer over the nMOS site using a first heavy ion implantation, and implanting arsenic solely into the a- Si layer;

15 d) masking the nMOS site formed by step c), forming an a-Si layer over the pMOS site using a second heavy ion implantation, and implanting boron solely into the a- Si regions;

20 e) laser annealing the nMOS and pMOS sites for a short time and at an energy level sufficient to melt at least a portion of the a- Si but insufficient to melt the polysilicon; and

f) affecting cooling after laser annealing to convert a- Si into polysilicon without gate oxide damage.